Chem CP7b Testing for anions

Your teacher may watch to see if you can:

- carry out an experiment appropriately
- use apparatus accurately and safely.

Aim

You will use simple chemical tests to identify **halide ions** (Cl^-, Br^- or I^-), sulfate ions (SO_4^{2-}) or carbonate ions (CO_3^{2-}) in known solutions. You will then use these tests to identify the **anions** in different unknown solutions.

Method

Apparatus

- eye protection
- dropping pipettes
- test tubes
- test-tube rack
- dilute nitric acid
- silver nitrate solution
- dilute hydrochloric acid
- barium chloride solution
- known solutions
- unknown solutions

⚠ Safety

Wear eye protection and avoid skin contact with the substances used.

Barium chloride solution is harmful.

Dilute nitric acid is an irritant.

Testing for halide ions

A Fill a test tube to a depth of about 2 cm with one of the solutions containing halide ions (Cl^-, Br^- or I^- ions).

B Add a few drops of dilute nitric acid then shake the test tube to mix its contents.

C Add a few drops of silver nitrate solution. Record the colour of the precipitate produced.

D Repeat steps **A**–**C** with the other known solutions that contain halide ions (Cl^-, Br^- or I^- ions).

Testing for sulfate ions

E Fill a test tube to a depth of about 2 cm with the solution containing sulfate ions, SO_4^{2-}.

F Add a few drops of dilute hydrochloric acid then shake the test tube to mix its contents.

G Add a few drops of barium chloride solution. Record the colour of the precipitate produced.

Testing for carbonate ions

H Fill a test tube to a depth of about 2 cm with the solution containing carbonate ions, CO_3^{2-}.

I Add a few drops of dilute nitric acid or dilute hydrochloric acid. Record whether bubbling occurs.

Identifying anions in solution

J Fill a test tube to a depth of about 2 cm with one of the unknown solutions.

K Carry out a test for halide ions or sulfate ions. Also look for bubbling (and so the presence of carbonate ions) when you acidify the solution with dilute nitric acid or dilute hydrochloric acid.

L Repeat steps **J** and **K** until you have determined which anions each unknown solution contains.

Recording your results

Make suitable tables, for example to record the silver **halide** precipitate colours of the known solutions and the results of the tests carried on the unknown solutions. Some suitable table headings are shown below.

Halide ion	Silver halide precipitate colour

Unknown	Test	Observations

Considering your results

1 Use your results to identify the anions in each unknown solution.

Evaluation

2 Silver carbonate and barium carbonate are insoluble solids. Suggest an explanation for why dilute acids are added to the test solutions in steps **B** and **F**.